First GERB climate results
-
International collaboration on future earth radiation measurements

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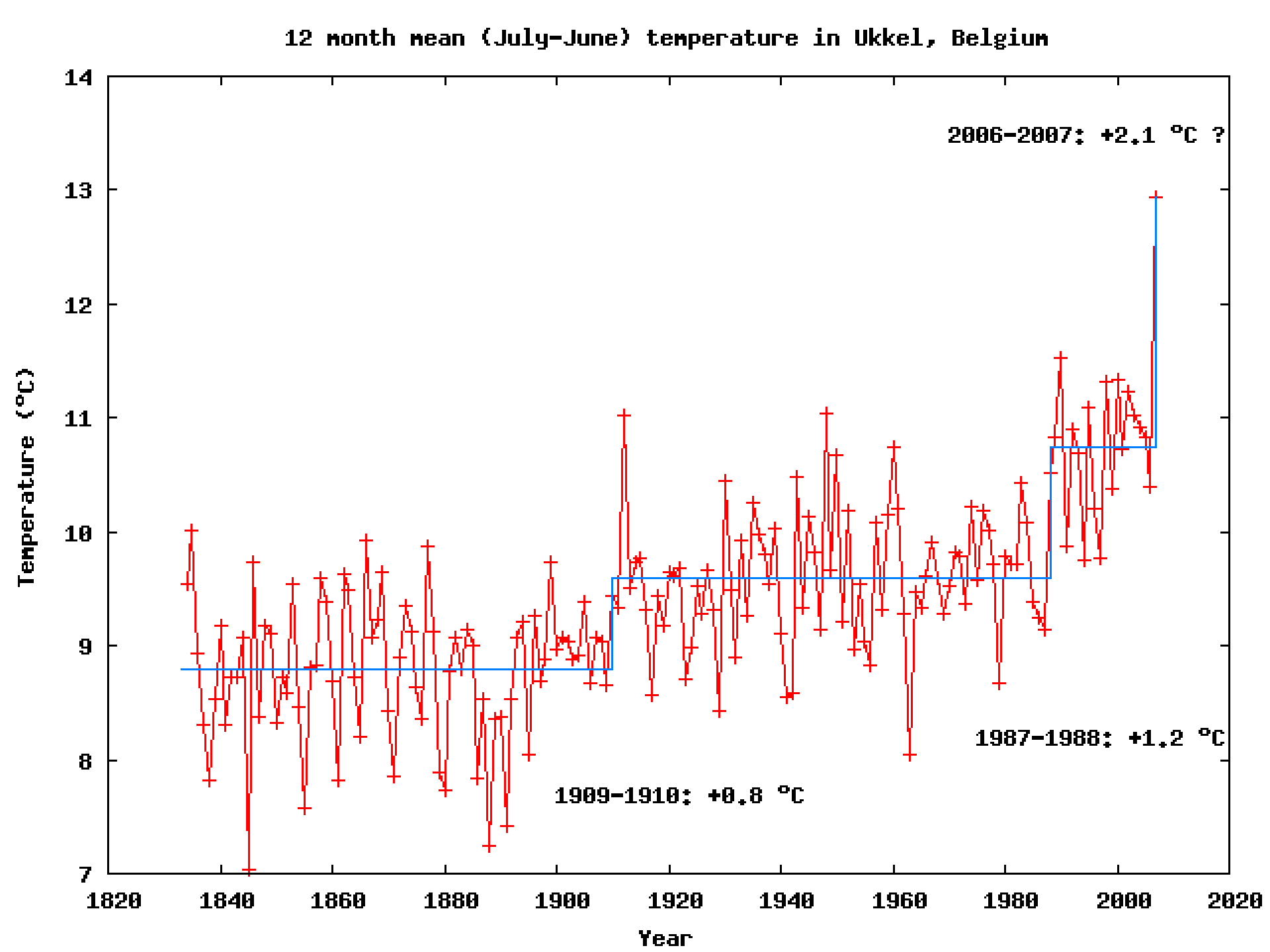
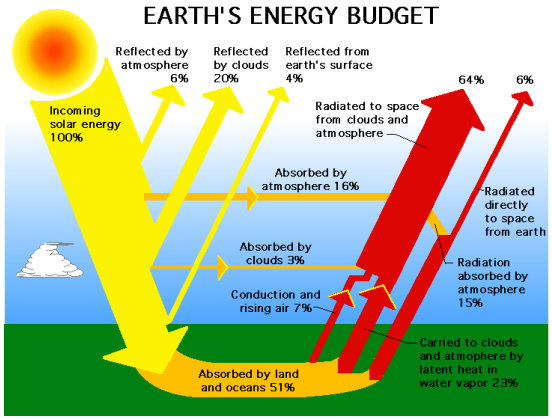
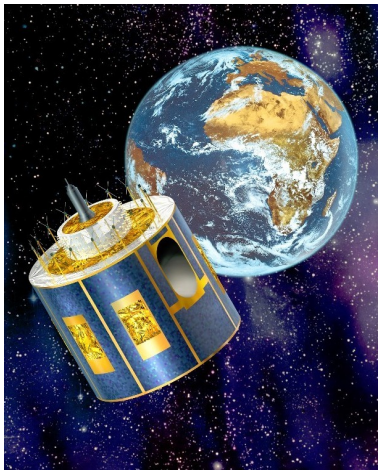

12 month mean (July-June) temperature in Ukkel, Belgium
2006-2007: +2.1 °C ?
1987-1988: +1.2 °C
1909-1910: +0.8 °C
Temperature (°C)
Year
14
13
12
11
10
9
8
7
1820
1840
1860
1880
1900
1920
1940
1960
1980
2000
2020

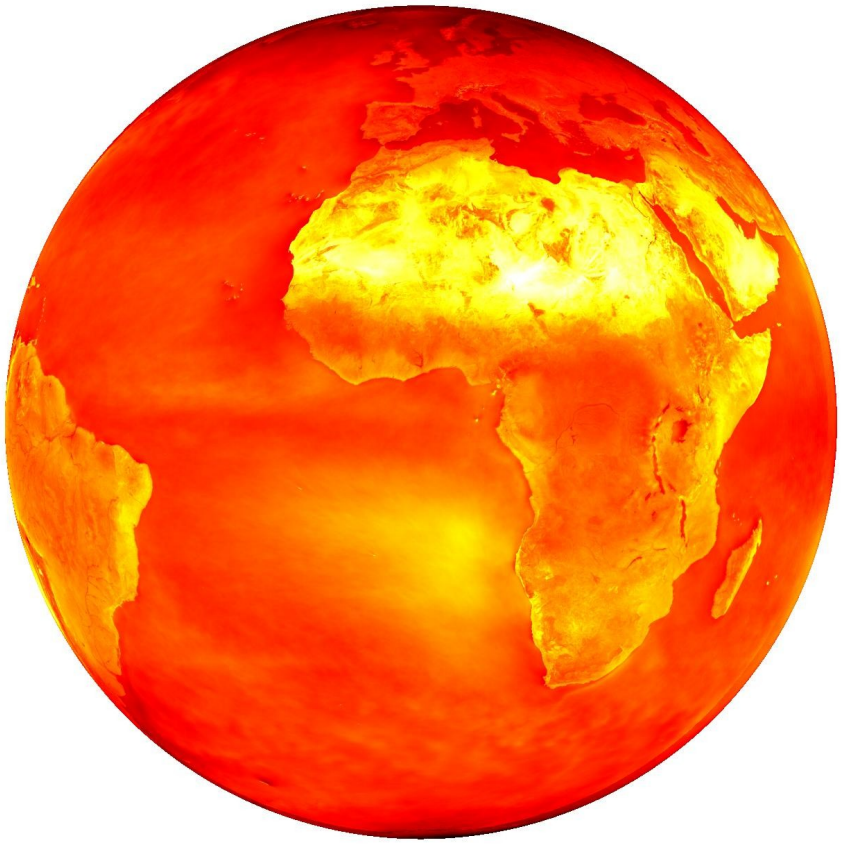
The GERB instrument on MSG





- Edition 1/V3 TOA fluxes GERB2/Meteosat8 available up to April 2007.
- Sun-burn in spring 2005.
- Used data: 2 years from March 2005-April 2007

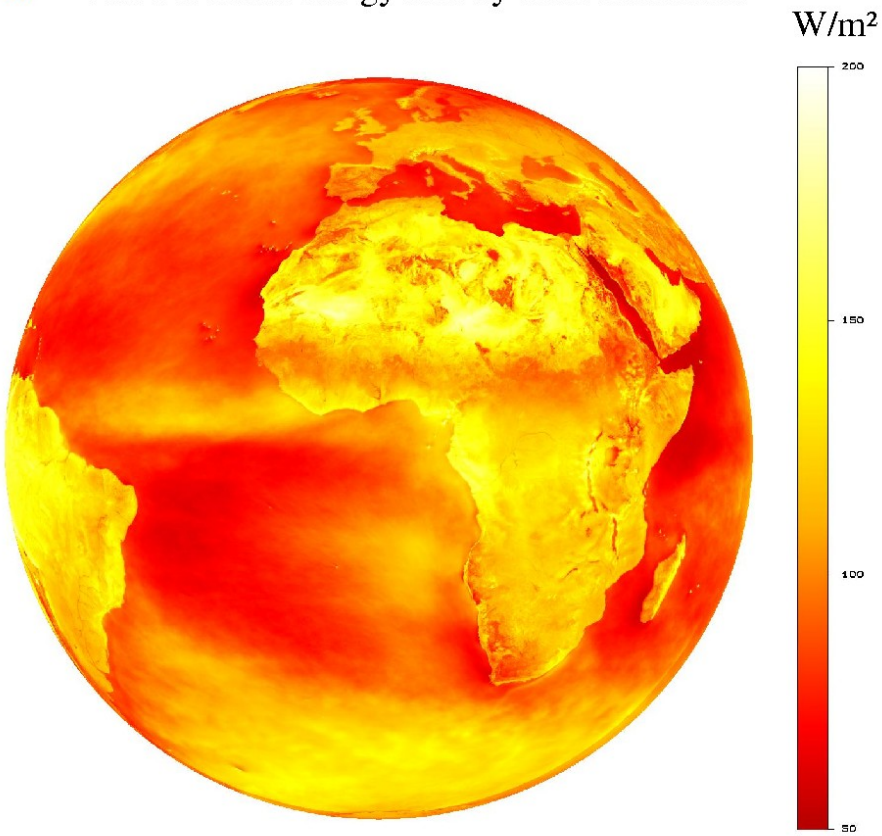
measured by GERB (SHI V3+gap filling)



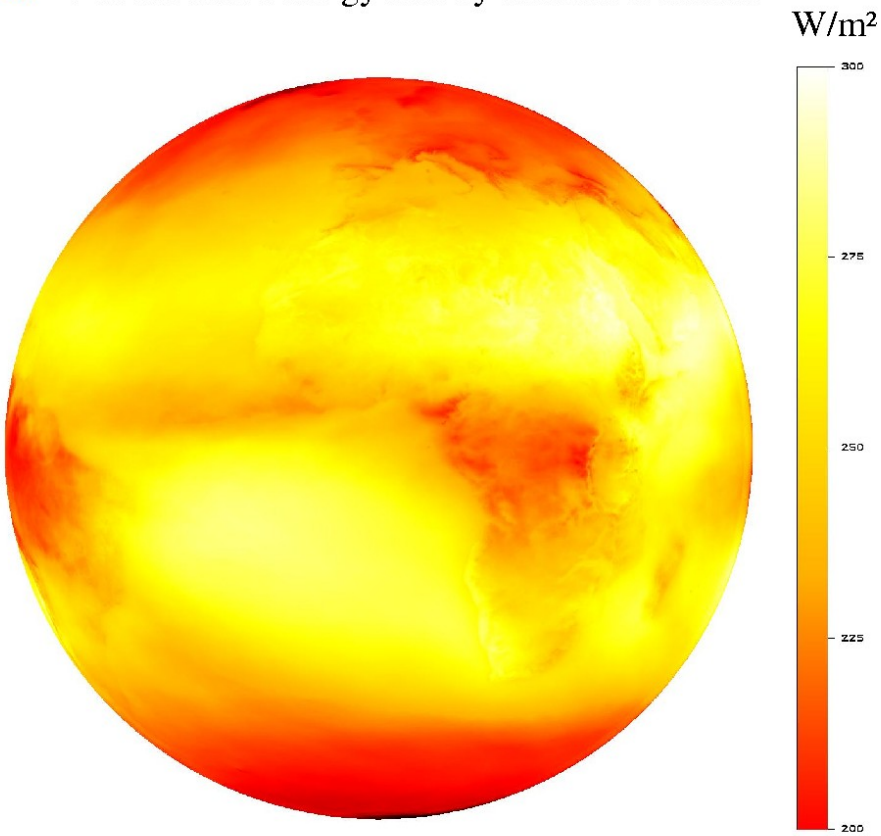
- Largest energy loss: Sahara and stratocumulus region.
- Direct link radiation <-> dynamics trough Hadley circulation.

Components energy loss

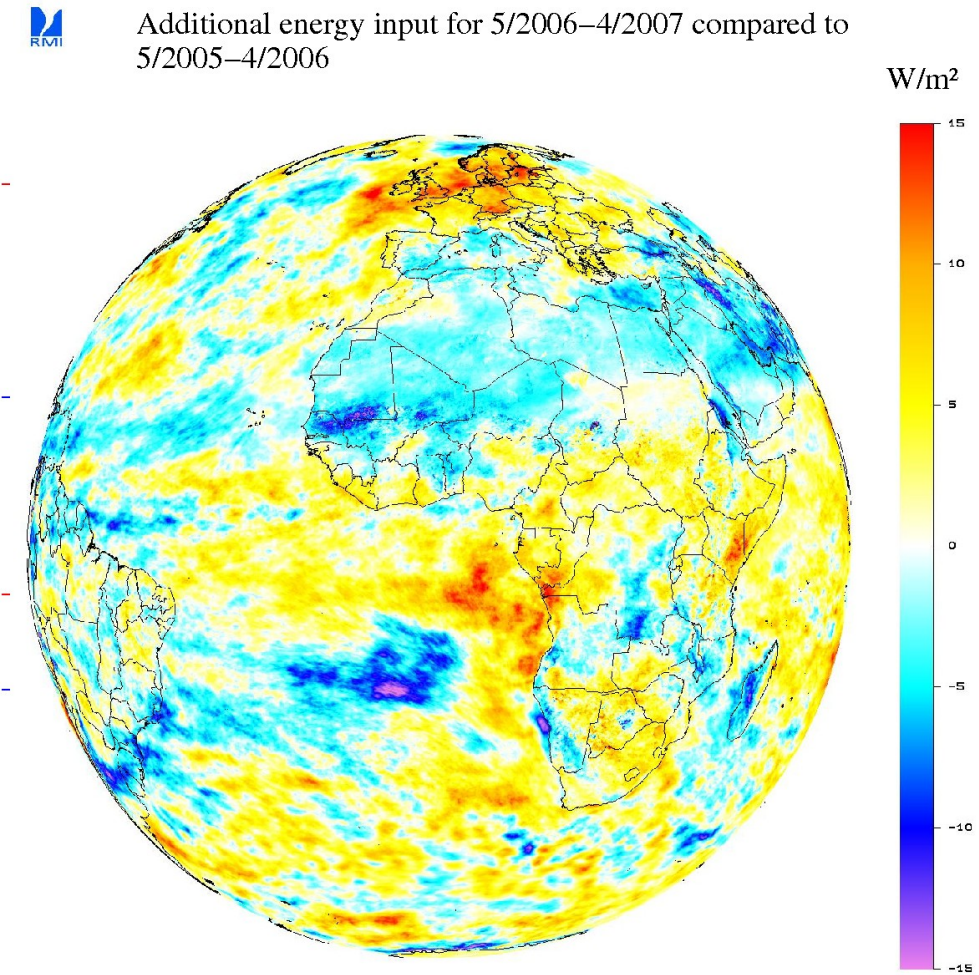
Annual mean energy loss by solar reflection

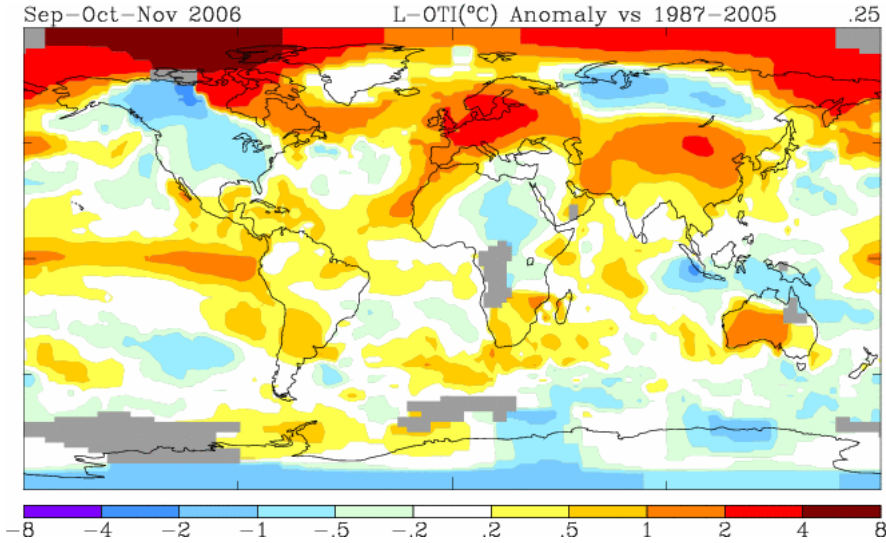


Annual mean energy loss by thermal emission



Change in net energy gain and temperature change





Chinese earth radiation instruments

- First instrument on FY3-A with foreseen launch April 2008, more to follow on operational FY3 series.
- Lack of experience/manpower for data processing
  -> help from GERB and CERES teams needed.
- Several attempts for Chinese visit to US failed.
- Invite Chinese and US colleagues to Europe.

Post-EPS requirements.

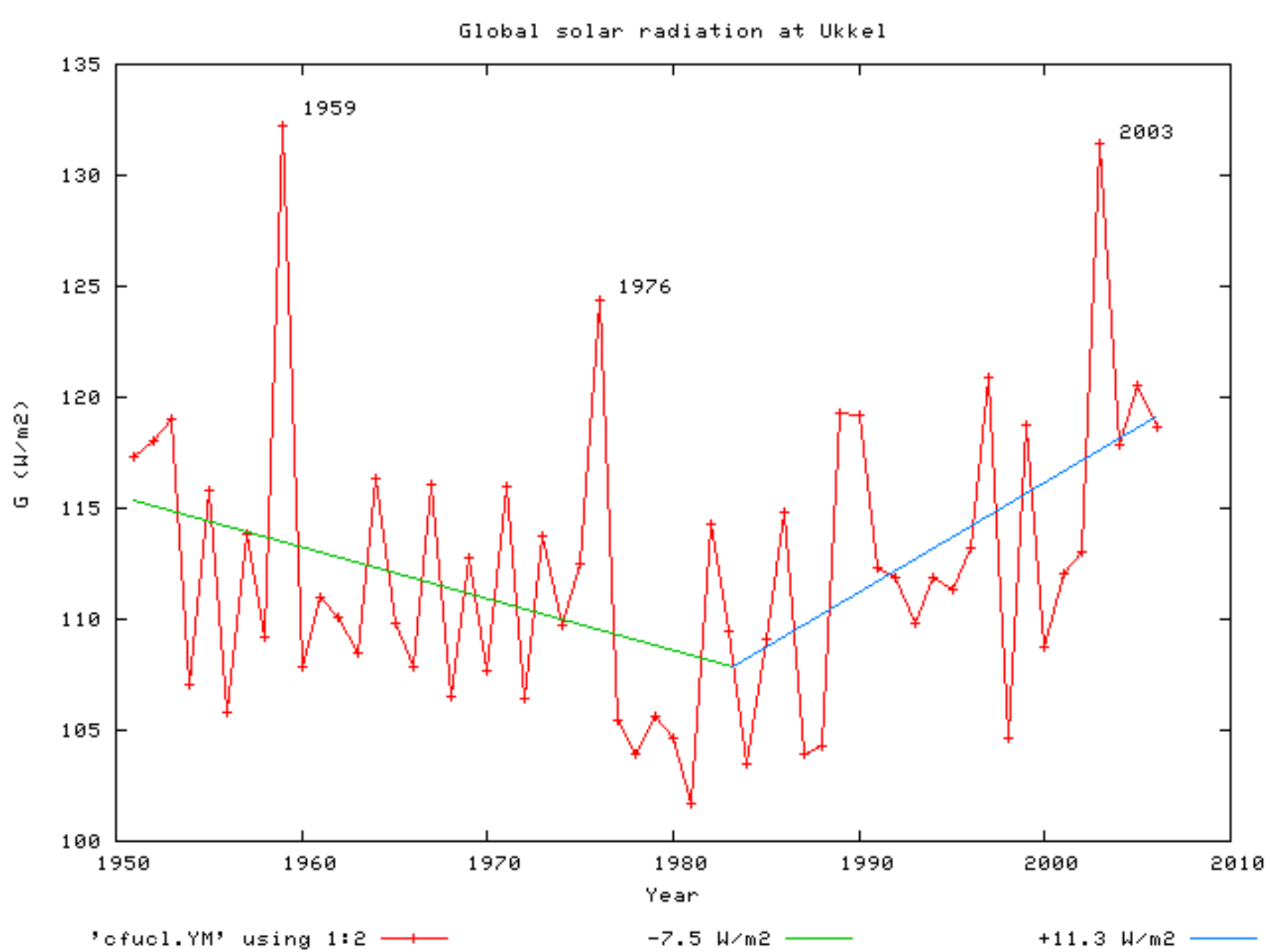
- In Europe, Eumetsat gathered requirements for polar observations after 2015 (Post-EPS).
- Earth radiation measurements have highest priority for climate, but low overall priority.
- If US continues CERES measurements, can they be complemented by European radiation measurements ?
- Need for vision international radiation community (GERB+CERES teams).
- Example vision: altimeter community: one accurate instrument + 2 less accurate instruments for sampling needed.

Example visions

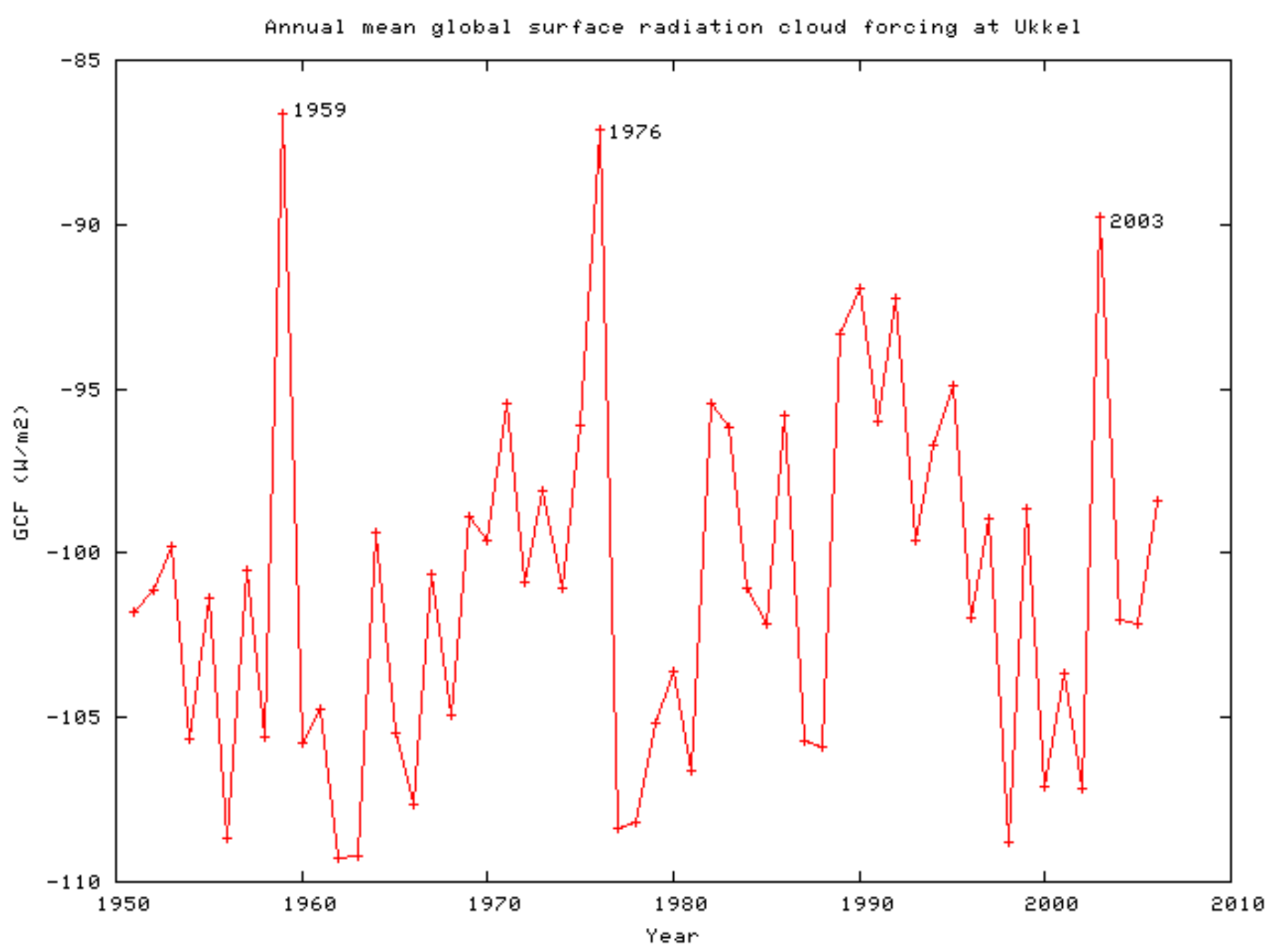
- Focus on sampling: 1 polar + 3 geostationaries spaced 120°
- Focus on stability to detect climate change: min. 3 polars (no gaps and allows voting) with different orbits for sampling
- Focus on accuracy of budget: need 1 instrument which can link incoming solar to outgoing terrestrial

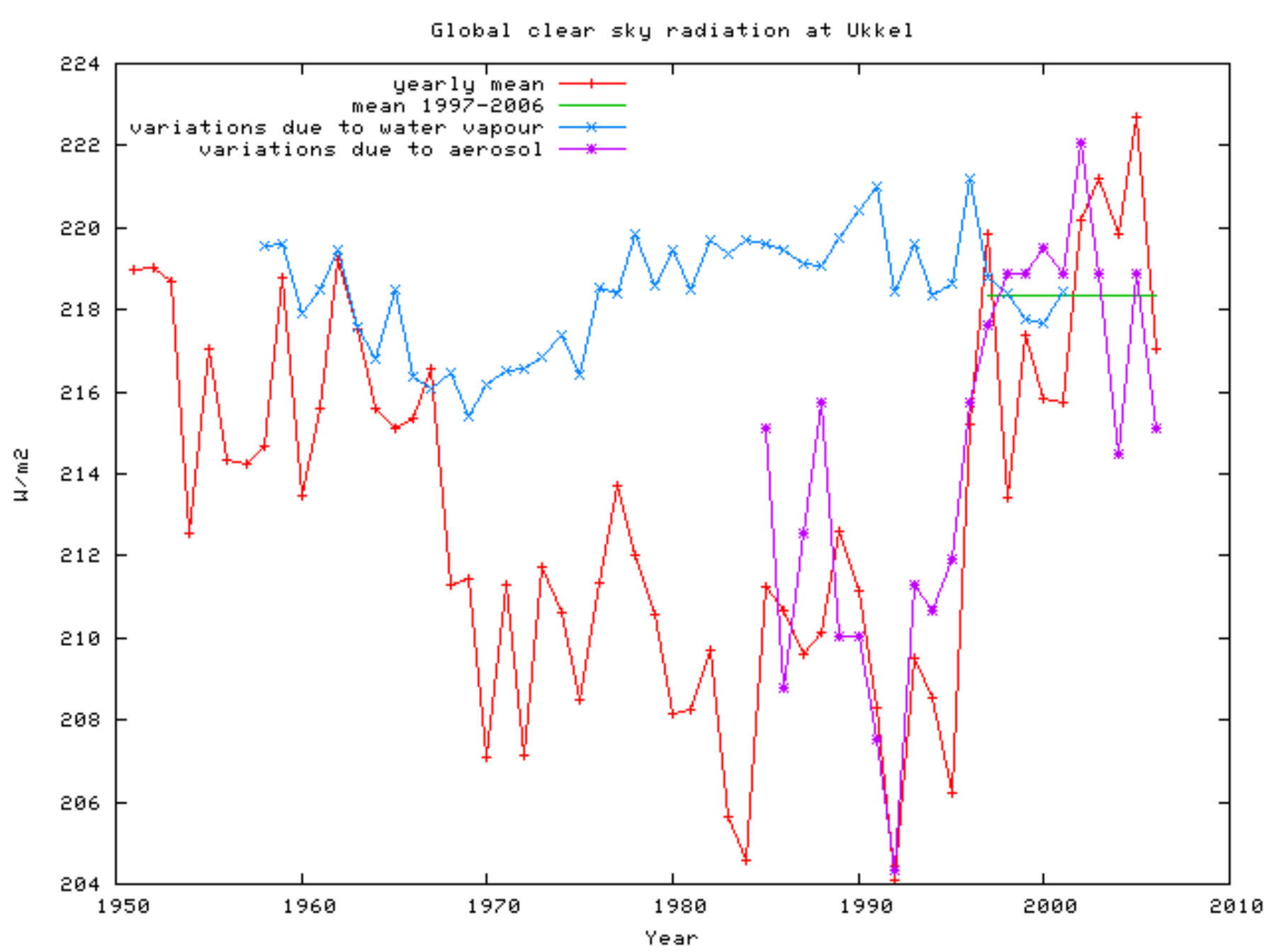
Conclusions

- The Earth is cooled by the Sahara and the stratocumulus region.
- GERB radiation anomalies agree well with temperature anomalies.
- Need to initiate a science team for the Chinese radiation budget instrument.
- Need for a vision from the GERB+CERES teams for future radiation budget missions.



ERES meeting, Victoria, 14-16/11/2007


Annual mean global surface radiation cloud forcing at Ukkel
GCF (W/m2)
Year
1959
1976
2003
-85
-90
-95
-100
-105
-110
1950
1960
1970
1980
1990
2000
2010


Global clear sky radiation at Ukkel
yearly mean
mean 1997-2006
variations due to water vapour
variations due to aerosol
W/m2
Year
224
222
220
218
216
214
212
210
208
206
204
1950
1960
1970
1980
1990
2000
2010